

**Minutes for GLAST-GRB Science Team VRVS Conference**  
**Friday, June 7, 2002 10am-12noon EDT**

The VRVS Conference held in the Sun room was joined at some point by Jay Norris, Roland Svensson, Steve Ritz, Nicola Omodei, Francesco Longo and Guido Barbiellini, Brenda Dingus, Boris Shchinov, Miguel del Val Borro, Giselher Lichti, Denis Comelli, Galvez Philippe, Demos Kazanas, and Jerry Bonnell.

Jay Norris introduced Demos and noted that the Marshall/GBM group and others are still having trouble joining VRVS due to internet firewall conflicts. Valerie Connaughton (also with the GBM/GLAST SSC) and Rob Preece based at Marshall are slated to join the group discussions in the future.

Francesco Longo suggested a GRB breakout session with VRVS participation could be held at the upcoming SLAC workshop. (This has now been arranged for Friday morning, with both VRVS and teleconference scheduled).

**GRB Simulations:**

Nicola Omodei proposed generating libraries of simulated GRBs and presented an example figure at URL [http://www.pi.infn.it/~omodei/picture\\_gallery/grab/snapshot1.jpg](http://www.pi.infn.it/~omodei/picture_gallery/grab/snapshot1.jpg)  
He solicited suggestions for quantities to be represented in a catalog of the simulated GRBs (e.g. T90s, spectral indices, etc.)

Norris reports that the IDL simulations of GRBs have been transliterated into the C++ / GLAST simulations, and into the new GLEAM version, by Sandhia Bansal. The main module name is "GRBmaker."

It was noted that while the IDL simulations extrapolate GRB properties from lower energies, Omodei's simulator, "GRBsim," will require long CPU times to work in the keV range (up to millions of photons generated). This is true for GRBmaker as well.

Norris comments that we need a list of GRB characteristics that the simulations should reproduce. Some goals include use of the simulations to evaluate LAT localizations and triggers and to test analysis tools. (GRB software tools requirements documents will be discussed as a following agenda item).

Francesco suggests an integrated interface for the GRB simulator that combines X-ray and gamma-ray regimes. Preece and Connaughton are expected to participate at the SLAC June 12-14 meeting via teleconferencing, and so can represent GBM aspects.

Longo and others note that energy dependent lags, quantum gravity considerations, and predicted pulse properties should also be incorporated into the GRB simulations and tests.

Demos Kazanas described his recent work on modeling GRB emission with external shocks which predict three spectral components. Much discussion ensued about the physics of the three components. Clearly this model could also be developed and predictions utilized within the GLAST GRB simulations.

Norris notes that Jay Salmonson (LLNL) will be collaborating on the physical interpretation of GRB pulse properties.

Barbiellini asks if Éclair (sp?) mission GRB simulations would be relevant to GLAST? Brenda Dingus answers yes.

### **GRB Analysis Tools:**

Norris announces that the GRB science tools documents have been circulated and solicits comments.

Regarding tool A5:

Brenda Dingus indicates A5 tool should be able to combine/coadd faint bursts for further analysis. Need such capability since there will be many faint bursts. Also we need to consider exploring small time bins and very low count rates when doing spatial temporal, and spectral analysis. WE REALLY WANT TO LOOK AT EVERY SINGLE HIGH ENERGY PHOTON ascribable to a burst. Analysis tools may not transfer well from AGN source considerations to GRBs. Likelihood approach to GRBs may be difficult. Also, combined LAT/GBM spectral analysis is needed. Others comment ...

Regarding tool A6:

Norris relays Seth Digel's comment that the "fitting engine" comparing models to observations needs to be determined.

Longo notes a suite of models should be incorporated and an evaluation figure of merit/significance should be used.

Kazanas is pessimistic that physical models will give good fits to the observations except in the more general, perhaps time-averaged properties.

Norris is optimistic that lessons learned from Swift will help.

Dingus asks what tools for finding and localizing bursts exist? Norris responds that likelihood tools will probably be used on the ground as they will be for finding persistent sources, but on-board considerations are still in work. Steve Ritz is coordinating that effort.

## **Collected Action Items:**

1. The two C++ GRB simulation codes, should stay in repository at SLAC with links to the modules' whereabouts and with short descriptions on the GRB Science team web site.
2. GRBsim and GRBmaker modules should be integrated into one library, for mutual benefit and efficiency.
3. GRB simulations should be extended into GBM range to exercise GBM-LAT combined analysis tools. How to best to do simulate GBM regime, given the large fluxes at lower energies, and to combine with LAT simulations? (And how to arrive at a first realization of this goal in the near term?)
4. We should find out to what level GLAST investigators will be able to access the AGILE GRB data, especially for GLAST analysis preparations (Francesco et al. to inquire). Also, Francesco asks if the Eclair mission's GRB data would be relevant to GLAST? Brenda answers yes. (Can we hope to access the Eclair data for joint analysis with GLAST? Eclair will complement the GBM's coverage of GRBs at low energy.)
5. Considering that, even in bright bursts, short time intervals could easily contain as few as ~ 10 LAT photons, (non)binning approaches need to be carefully considered. We should exercise GRB simulations through analysis tool A5 (prototype?) to this end, especially remembering treatment of every (likely) high-energy photon from the burst.
6. The standard likelihood tool needs to be tested (modified) for its ability to provide GRB localizations, especially near the limit of detection. (Editor's note: a central consideration here may be the steps preceding use of likelihood, where photon set to be analyzed is selected.)

## **In Closing:**

Brenda Dingus wants to hire a postdoc. Any suggestions would be appreciated.

Francesco Longo suggests a paper that might offer lessons on finding GRBs in tracker data: "Search for short bursts of gamma-ray emission in spark chamber data application to COS-B" – Buccheri, R., Fry, W.F., Maccarone, M.C 1993, A&A, 277, 353.